1982 CARBON RESEARCH ACCOMPLISHMENTS

The carbon laboratory is now equipped to measure the important properties of pitch and coke raw materials as well as most of the important properties of anode composites. Anodes can be made of the Soderburg and prebaked type.

Changes in coke source and/or its properties may mean that the Columbia Falls paste formulation is no longer operating at optimum granulometry. The goal of Phase I of the Anode Optimization Proposal was to obtain a coke granulometry with maximum vibrated dry bulk density (VDBD).

Five statistically designed experimental campaigns yielded an improvement in VDBD for the existing ARCO coke from 1.15 to 1.24 gm/cm^3 with an increase from 9.4 percent to 40 percent of intermediate (-28 to +100 mesh) fraction.

Production of paste based upon the aggregate size distribution with maximum VDBD is planned in 1983 to evaluate anode properties, particularly rheological characteristics.

A study concerning the use of Ashland A-240 petroleum pitch as an anode binder was initiated to reduce environmental emissions as well as to potentially provide a new binder source. Anodes were made from both Ashland petroleum pitch and Reilly coal-tar pitch following Columbia Falls

laboratory procedures. Pitch, green paste, and baked paste properties were measured.

A maximum baked apparent density of 1.50 gm/cm^3 was obtained for a 23 percent Ashland petroleum pitch anode compared to 1.52 gm/cm^3 for a 26 percent Reilly pitch anode. Compressive strength and electrical resistivity of the baked anodes were also comparable.

Critical tests yet to be completed are air burn and carbon anode consumption.

Core samples of large and regular anodes were sent to Tucson to measure the electrical resistivity to provide additional information as to the quality of the anodes baked at Sebree and to determine if there was a significant difference in the bake uniformity within the two block sizes. The large anode core samples were found to have higher baked densities than the regular anodes (5.7 to 6.4 mΩ-cm and 1.56 to 1.53 g/cc, respectively). As a whole, the large anode samples were also found to be more uniform than the regular anodes. However, within the large block samples, there was a statistically significant difference in the cores taken from the top region of the furnace pit to those from the middle; possibly indicating greater thermal gradients. Changes in the mix formulations and baking conditions are the probable causes for differences in the baked properties.